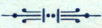


A. G. MUMFORD.

SECTION B.

STEAM BOILERS.

From GENERAL CATALOGUE No. 6.  EDITION 1900.

CULVER STREET ENGINEERING WORKS,
COLCHESTER,
ENGLAND.

Telegraphic Address - - - - "MUMFORD, COLCHESTER."

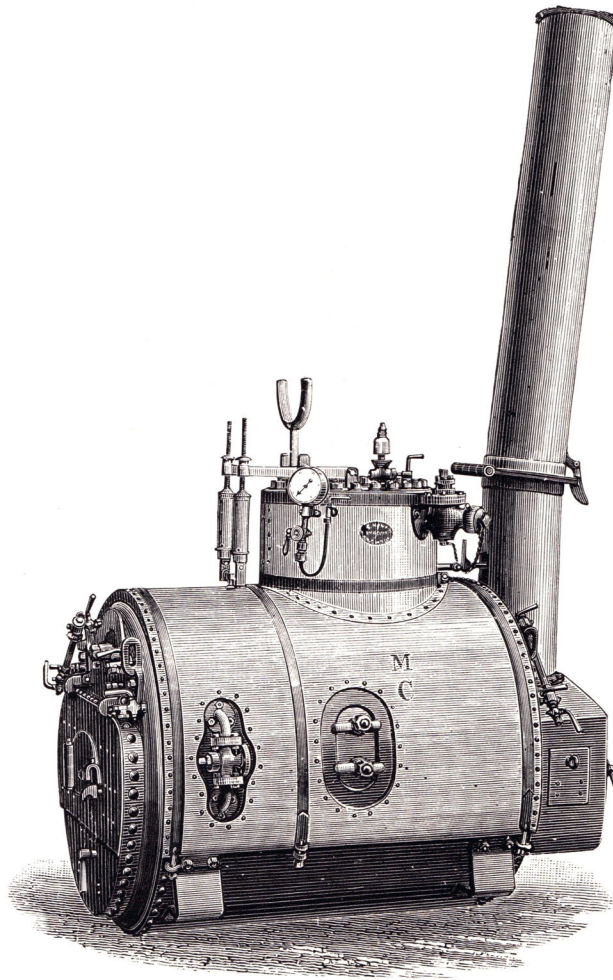
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LAUNCH BOILER.

LAGGED WITH GALVANIZED SHEET IRON OR WOOD
WITH BRASS BANDS.



This Illustration is reproduced from a Photograph.

THIS TYPE OF LAUNCH BOILER IS EXTENSIVELY USED BY THE BRITISH ADMIRALTY.

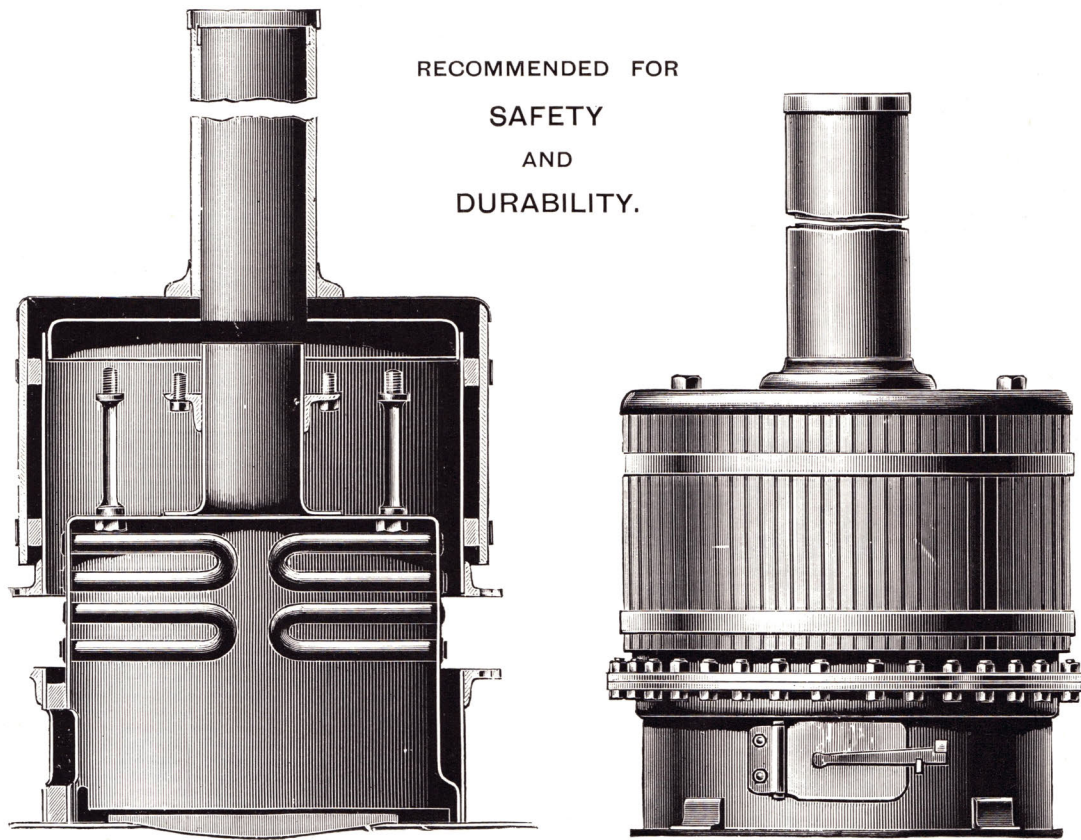
PRICES ON APPLICATION.

CULVER STREET ENGINEERING WORKS, COLCHESTER.

A. G. MUMFORD,

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IMPROVED VERTICAL WATER-TUBE BOILER
FOR
STEAM LAUNCHES.



These Illustrations are reproduced from Drawings.

THE ABOVE ILLUSTRATIONS REPRESENT, IN SECTION AND ELEVATION, AN IMPROVED DESIGN OF A VERTICAL WATER-TUBE BOILER, WHICH HAS THE ADVANTAGE OF POSSESSING VERY EXTENSIVE HEATING AND GRATE SURFACES WITHIN A SMALL COMPASS.

THE SECTIONAL VIEW SHOWS THE OUTER SHELL RAISED, IN ORDER TO ILLUSTRATE HOW EASILY ACCESS MAY BE OBTAINED TO THE TUBES AND FIRE-BOX FOR THE PROCESS OF SCALING AND CLEANING.

**TESTED TO A COLD WATER PRESSURE OF 240 LBS. AND UPWARDS PER
SQUARE INCH.**

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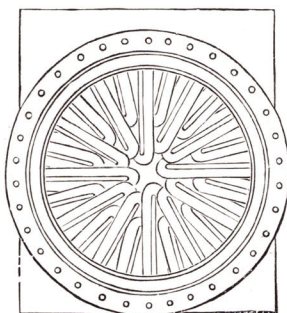
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IMPROVED VERTICAL WATER-TUBE BOILER **FOR** **STEAM LAUNCHES.**

THE ADVANTAGES to be derived from the use of these Boilers in Steam Launches are numerous.

ITS DESIGN will be apparent upon referring to the Sectional Drawing shown upon the opposite page.

THE ADDITIONAL AREA of heating surface is due to the C-shaped Brass Water-tubes which project into the Fire-box from the annular water space, as represented in the following diagram :



INCREASED DIAMETER given to the shell provides for a larger area of grate surface, as well as augmenting the cubic contents of the steam space.

BY REMOVING THE BOLTS, which secure the angles immediately above the Fire-door, and also those surrounding the uptake, the outer shell of the Boiler can be conveniently removed, leaving the Fire-box Plates and Water-tubes free for scaling and cleaning, as well as the inside of the shell.

HENCE THESE IMPROVEMENTS ensure the **SAFETY** as well as the **DURABILITY** of the Boiler, a desirability long wished for by owners of Steam Launches.

THE BOILER is complete with all the usual fittings, and is lagged with mahogany or teak; the top as well as the funnel being encased with sheet iron or brass.

FOR FULL SPECIFICATION AND DIMENSIONS, SEE PAGES 12 AND 13.

FOR PRICES SEE SEPARATE LIST AT END OF CATALOGUE.

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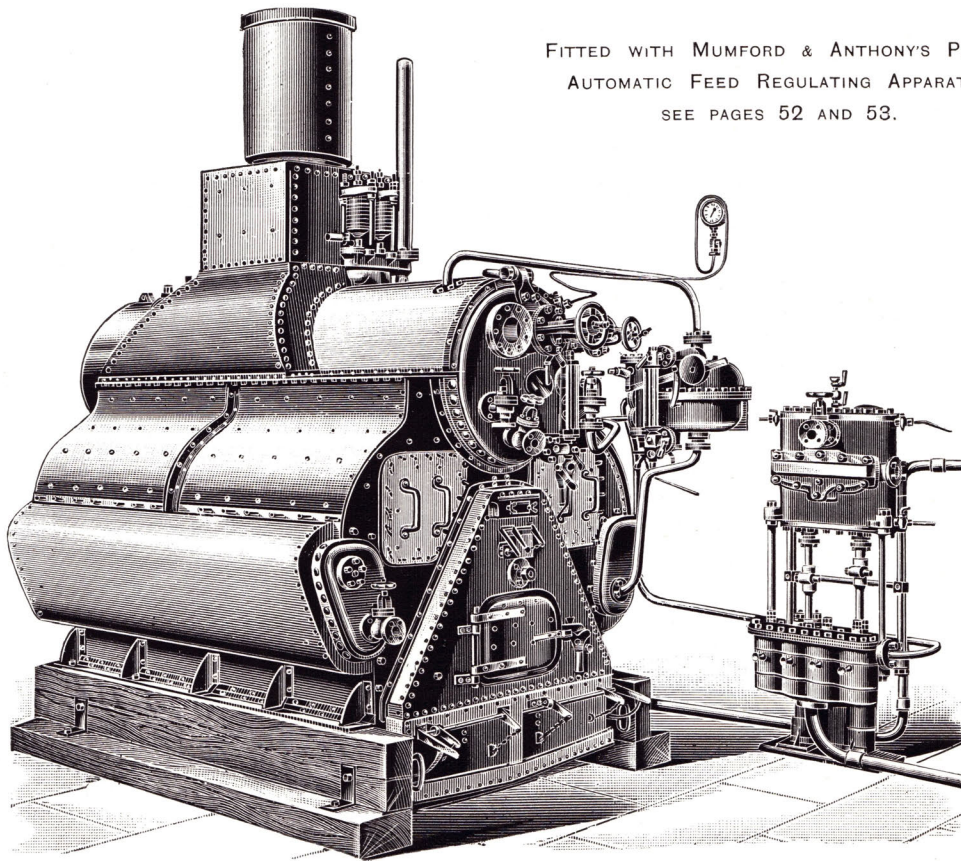
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CONTRACTOR to the ADMIRALTY, WAR OFFICE, INDIA OFFICE, CROWN AGENTS for the
COLONIES, SPANISH and other FOREIGN GOVERNMENTS, &c.

PATENT WATER-TUBE BOILER.

AS SUPPLIED TO THE ENGLISH ADMIRALTY
FOR
FIRST-CLASS TORPEDO AND VEDETTE BOATS.

FITTED WITH MUMFORD & ANTHONY'S PATENT
AUTOMATIC FEED REGULATING APPARATUS,
SEE PAGES 52 AND 53.



This Illustration is reproduced from a Photograph.

**THIS BOILER CONTAINS A GRATE AREA OF 22 SQUARE FEET AND A HEATING
SURFACE OF 850 SQUARE FEET.**

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PATENT WATER-TUBE BOILER.

AS SUPPLIED TO THE ENGLISH ADMIRALTY
FOR
FIRST-CLASS TORPEDO AND VEDETTE BOATS.

THIS SUCCESSFUL WATER-TUBE BOILER has been evolved by a series of exhaustive experiments carried on for some considerable time

During the progress of the designing stage, the main objects kept in view were the production of a Generator which would admit of **PROMPT AND EASY REPAIR**, whilst it should **NOT BE LESS ECONOMICAL AND EFFICIENT** than others of a like class.

The principle of construction is **VERY SIMPLE**, and can be understood by anyone who is conversant with Water-tube Express Boilers.

THIS SPECIAL TYPE OF WATER-TUBE BOILER HAS BEEN DESIGNED AND SUPPLIED
FOR FIRST-CLASS TORPEDO BOATS.

THE SPACE OCCUPIED = 9 FT. x 7 FT. x 6 FT. HIGH.

**STEAM CAN BE RAISED FROM A FEED-WATER TEMPERATURE OF 55 DEGREES,
TO A PRESSURE OF 130 LBS. IN 20 MINUTES FROM THE TIME OF
LIGHTING THE FIRE, WITHOUT THE SLIGHTEST RISK OF DAMAGE TO
THE BOILER.**

FOR SECTIONAL VIEWS AND FURTHER PARTICULARS, SEE PAGES 44 and 45.

PRICES UPON APPLICATION.

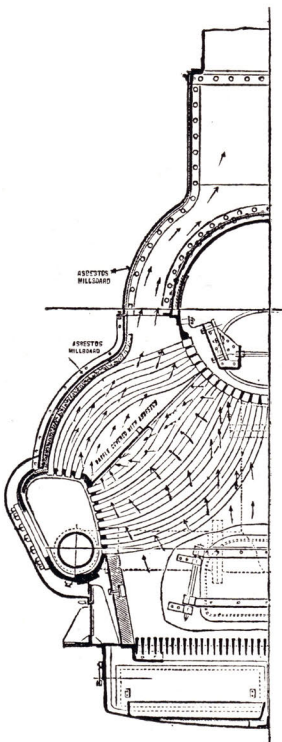
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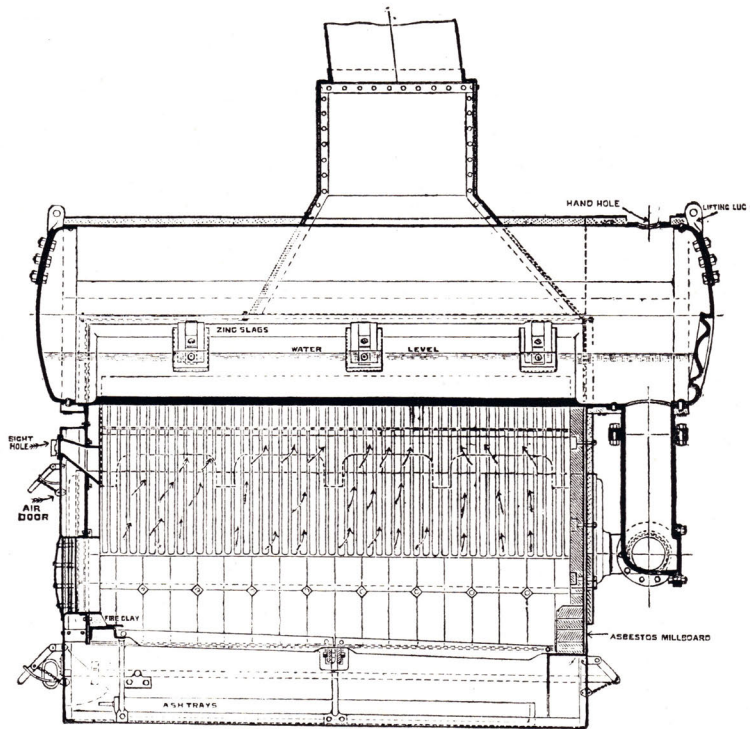
CONTRACTOR to the ADMIRALTY, WAR OFFICE, INDIA OFFICE, CROWN AGENTS for the
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PATENT WATER-TUBE BOILER.

AS SUPPLIED TO THE ENGLISH ADMIRALTY
FOR
FIRST-CLASS TORPEDO BOATS.



HALF TRANSVERSE SECTION.



HALF LONGITUDINAL SECTION.

These Illustrations are reproduced from Drawings.

SPACE OCCUPIED	-	-	-	=	9 FT. X 7 FT. X 6 FT. HIGH.
GRATE SURFACE	-	-	-	=	22 SQUARE FEET.
HEATING SURFACE	-	-	-	=	850 SQUARE FEET.
INDICATED HORSE-POWER				=	400.

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PATENT WATER-TUBE BOILER.

AS SUPPLIED TO THE ENGLISH ADMIRALTY
FOR
FIRST-CLASS TORPEDO BOATS.

The part sectional views of Water-tube Boiler here illustrated, of which the view on page 42 is an exterior, will explain the general internal construction, as well as the conformation, of Water-tubes necessary to accommodate the Boiler both to the small space allowed in Torpedo Boats and the **HIGH EFFICIENCY REQUIRED.**

The results of the Official evaporation trials, carried out by the Admiralty, proved that **FAR GREATER POWER COULD BE DEVELOPED** than that of 400 I.H.P., for which the Contract was given.

Especial attention has been given to the reduction of the gases to a very low temperature, with the result that at the base of the Funnel the temperature **NEVER BECAME EXCESSIVE** on the three hours' trials above mentioned.

One of the main features of importance in connection with this design is the fact that the Water Chambers are fitted with doors, so that in the event of any tube becoming damaged, it can be removed and replaced without disturbing those surrounding it in any way whatever. Another item of value is the facility with which all the tubes can be examined and cleaned, through the same medium.

**FOR PARTICULARS OF AUTOMATIC APPARATUS FOR REGULATING THE FEED AND
MAINTAINING THE WATER LEVEL IN THESE BOILERS, SEE PAGES 52 AND 53.**

PRICES UPON APPLICATION.

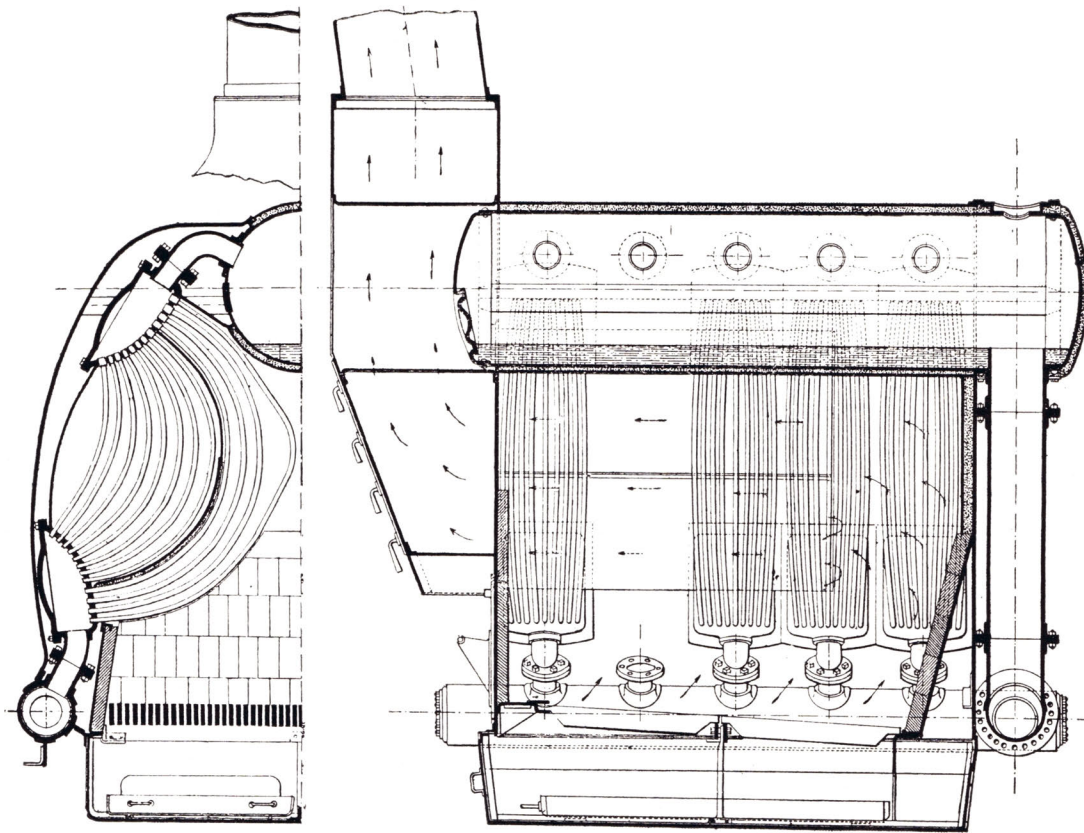
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PATENT WATER-TUBE BOILER.

AS SUPPLIED TO THE ENGLISH ADMIRALTY
FOR
H. M. S. "SALAMANDER."



HALF TRANSVERSE SECTION.

LONGITUDINAL SECTION.

These Illustrations are reproduced from Drawings.

SPACE OCCUPIED	- - - - -	= 13 FT. 8 INS. X 10 FT. 6 INS. X 11 FT. 4 INS. HIGH.
GRATE SURFACE	- - - - -	= 45 SQUARE FEET.
HEATING SURFACE	- - - - -	= 2,000 SQUARE FEET.
INDICATED HORSE-POWER		= 1,000.

CULVER STREET ENGINEERING WORKS, COLCHESTER.

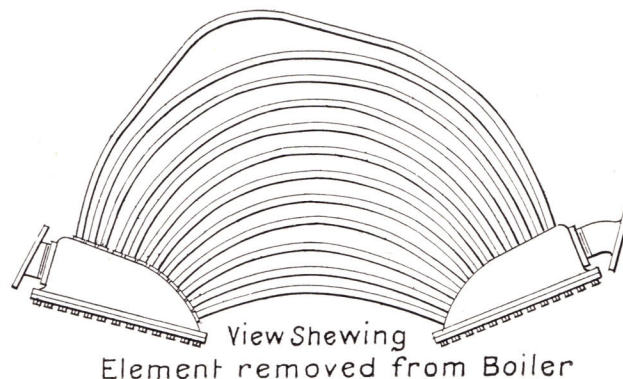
A. G. MUMFORD.

PATENT WATER-TUBE BOILER.

AS SUPPLIED TO THE ENGLISH ADMIRALTY
FOR
H.M.S. "SALAMANDER."

These sections represent those of a **LARGE SIZED WATER-TUBE BOILER**, the power of which is five times in excess of that illustrated upon page 42.

It will be seen that this Boiler is constructed in **ELEMENTS, OR GROUPS OF TUBES**, fitted into top and bottom boxes, which are made of forged steel, having one inlet in the bottom box and one outlet in the top box.



Without lifting the Boiler, any of these elements or nests of tubes can be disconnected, lowered into the furnace space, and removed through the furnace front for repairs **WITHOUT DISTURBING THE REMAINDER OF THE BOILER**, or necessitating the breaking of any joints, beyond the two connected with the element in question. By taking off the top and bottom covers of the tube-boxes a single defective tube in any position can be taken out and replaced by a new one, without interfering with those surrounding it.

The Boiler can be constructed either with **DIRECT THROUGH OR RETURN DRAUGHT**, and the Smoke-box placed at either end.

There is no delay in replacing the Elements, as the joints are accessible and easily made.

There is no riveting or caulking to be done in erecting, and this particular feature makes these Boilers **MOST SUITABLE FOR** districts where **TRANSPORT** is difficult, either on land or water.

A large number have been supplied to the English Admiralty, **ALL OF WHICH ARE GIVING SATISFACTION.**

**FOR PARTICULARS OF AUTOMATIC APPARATUS FOR REGULATING THE FEED
AND MAINTAINING THE WATER LEVEL IN WATER-TUBE BOILERS,
SEE PAGES 52 AND 53.**

PRICES AND FULL PARTICULARS ON APPLICATION.

CULVER STREET ENGINEERING WORKS, COLCHESTER.

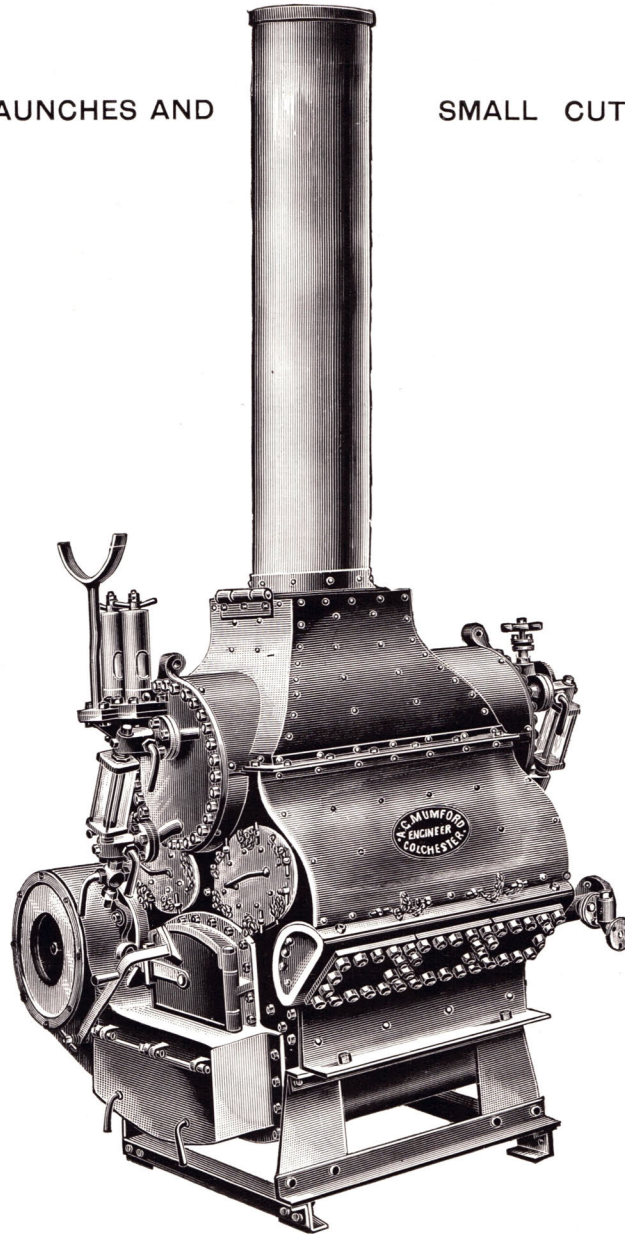
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PATENT WATER-TUBE BOILER.

FOR LAUNCHES AND

SMALL CUTTERS.



This Illustration is reproduced from a Photograph.

**AN INVALUABLE BOILER FOR SMALL CRAFT, OCCUPYING A MINIMUM OF
SPACE AND GIVING A MAXIMUM OF POWER.**

SPECIAL QUOTATIONS UPON APPLICATION.

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PATENT WATER-TUBE BOILER.

FOR LAUNCHES AND SMALL CUTTERS.

In this Boiler will be found **ALL THE ADVANTAGES OVER ORDINARY STEAM PRODUCERS** that are possessed by the larger type of Water-tube examples described in the foregoing pages.

Steam can be raised **VERY RAPIDLY**, and lowered **WITHOUT THE SLIGHTEST RISK** of causing the Boiler to leak, whilst the fuel consumption is **VERY LIGHT**.

The Tubes are of solid drawn steel, bent, and afterwards annealed, galvanized, and rolled into the Tube Plates.

ALL DETAILS OF CONSTRUCTION, upon which so much success depends, have been carefully designed.

The Illustration shows a Boiler fitted with Fan for supplying forced draught.

The configuration of the internal fittings is very similar to the Marine Boiler shown upon page 42.

CONSTRUCTED TO ANY REQUIRED WORKING PRESSURE.

PRICES UPON APPLICATION.

CULVER STREET ENGINEERING WORKS, COLCHESTER.

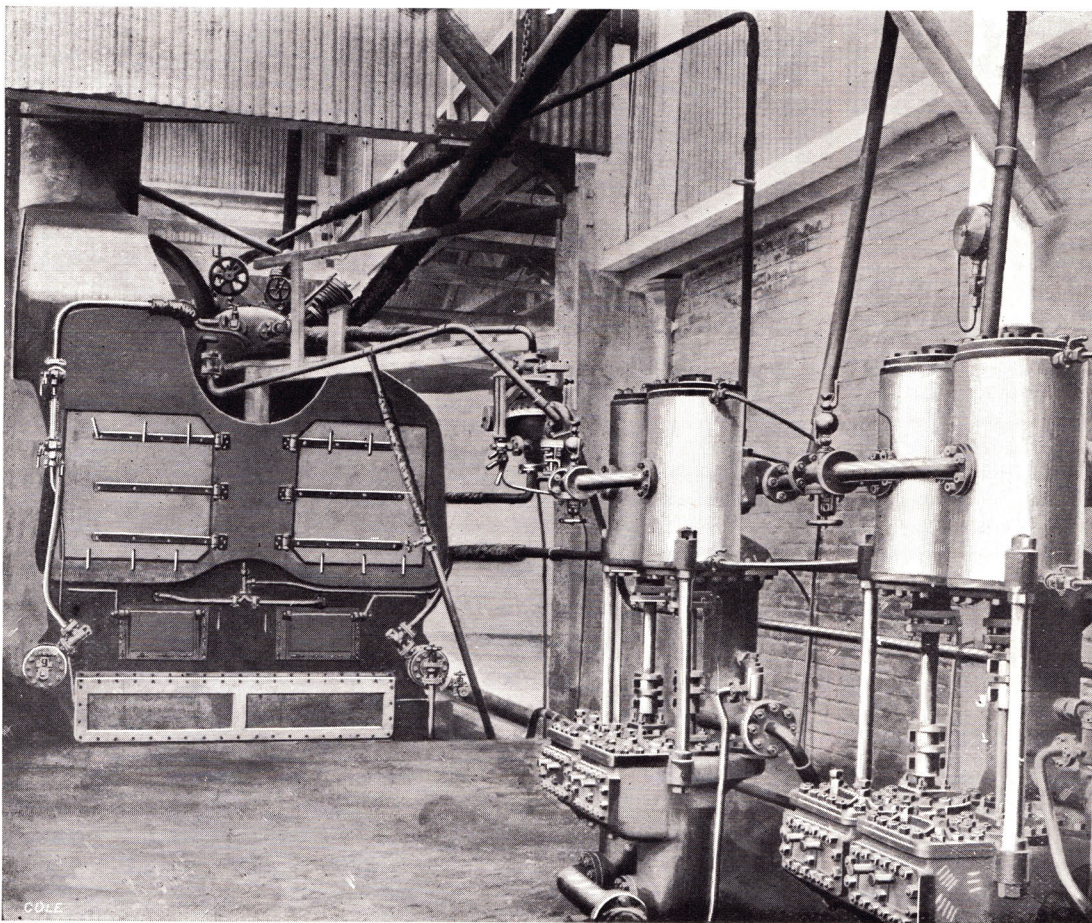
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PATENT WATER-TUBE BOILER.

AS SUPPLIED TO THE ENGLISH ADMIRALTY.

TESTING A WATER-TUBE BOILER IN THE CULVER STREET
ENGINEERING WORKS.



This Illustration is reproduced from a Photograph.

**PATENT WATER-TUBE BOILER OF 1,000 INDICATED HORSE-POWER, WITH
MUMFORD AND ANTHONY'S PATENT DUPLEX FEED PUMPS, AND
AUTOMATIC APPARATUS FOR CONTROLLING THE FEED AND MAINTAINING
A CONSTANT AND EVEN WATER LEVEL.**

ALL BOILERS ARE TESTED BEFORE LEAVING THE WORKS.

CULVER STREET ENGINEERING WORKS, COLOCHESTER.

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PATENT WATER-TUBE BOILER.

AS SUPPLIED TO THE ENGLISH ADMIRALTY.

TESTING ONE OF FOUR WATER-TUBE BOILERS, EACH OF 1,000
INDICATED HORSE-POWER, FOR H.M.S. "SALAMANDER."

The accompanying Illustration is from a Photograph, taken at the time when the
Admiralty authorities were conducting steam trials.

The said trials were **THOROUGHLY EXHAUSTIVE**, both under natural and heavy forced
draught. The Boiler was found to be very **EFFICIENT AND ECONOMICAL** under natural
draught, and showed a **HIGH RATE OF EVAPORATION** under forced draught.

Constructional details will be found described to some extent on pages 46 and 47.

The four Boilers, after having undergone their inspection tests, at the Culver Street
Works, were afterwards taken to pieces and transported to Devonport Dockyard,
where they were re-erected and again tested to the same pressure.

Taking to pieces and re-erecting this type of Boiler is an operation **EXTREMELY SIMPLE**,
as **BOLTS ARE ALONE USED** for making the joints.

**THESE BOILERS ARE FITTED WITH THE AUTOMATIC APPARATUS FOR CON-
TROLLING THE FEED AND MAINTAINING A CONSTANT AND EVEN WATER
LEVEL; PARTICULARS OF THE SAME WILL BE FOUND ON PAGES 52 AND 53.**

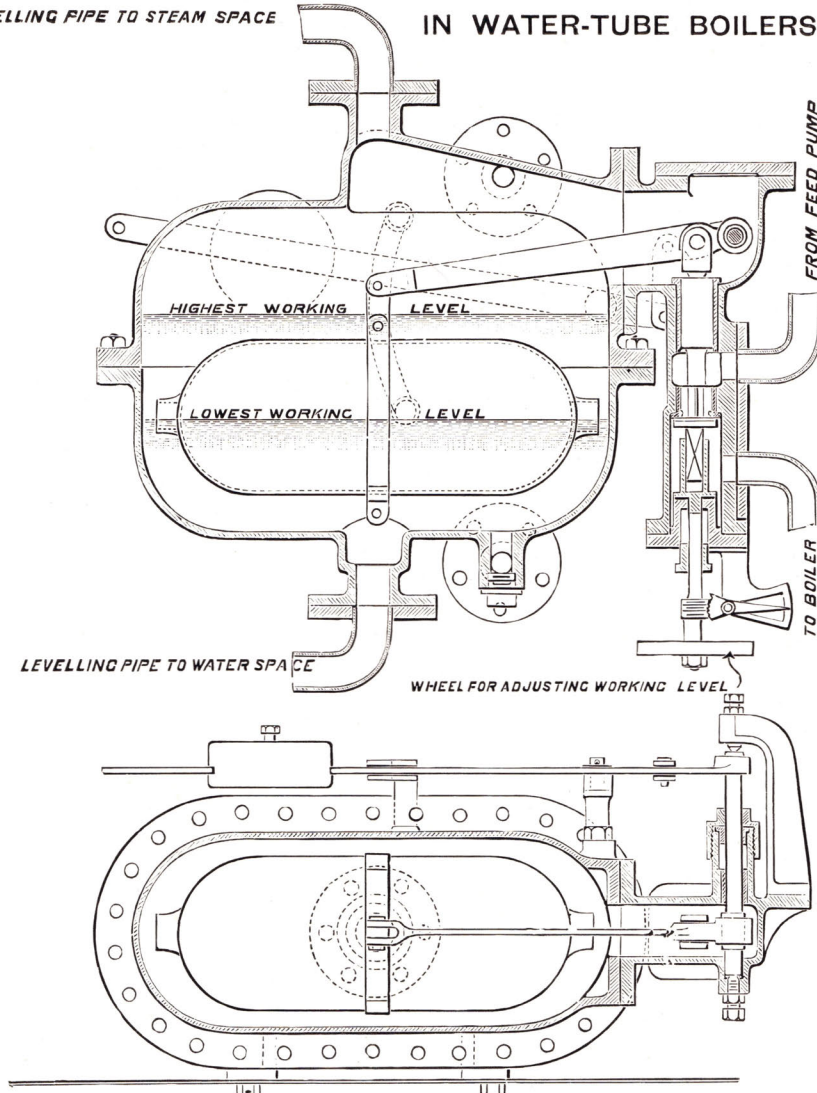
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COLONIES, SPANISH and other FOREIGN GOVERNMENTS, &c.

PATENT AUTOMATIC APPARATUS FOR REGULATING THE FEED & MAINTAINING THE WATER LEVEL

LEVELLING PIPE TO STEAM SPACE IN WATER-TUBE BOILERS.



These Illustrations are reproduced from Drawings.

AUTOMATIC REGULATORS, AS SHOWN ABOVE PARTLY IN SECTION, FOR CONTROLLING THE FEED WATER
SUPPLY AND MAINTAINING ITS LEVEL, HAVE BEEN FITTED TO ALL THE WATER-TUBE BOILERS OF
H.M.S. "SALAMANDER," AS WELL AS TO THOSE OF FIRST-CLASS TORPEDO BOATS.

OFFICIAL ADMIRALTY TESTS HAVE BEEN SATISFACTORILY CARRIED OUT.

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COLONIES, SPANISH and other FOREIGN GOVERNMENTS, &c.

PATENT AUTOMATIC APPARATUS FOR REGULATING THE FEED & MAINTAINING THE WATER LEVEL

IN WATER-TUBE BOILERS.

The duty of this apparatus is as mentioned above, viz.: that of maintaining the water level in Boilers of the **WATER-TUBE** Type.

This important level can be varied as may be desired, by adjusting the Hand-wheel at the bottom of the Valve-box, which raises or lowers the working lever as may be desired during the time the Boiler is running.

There is **ABSOLUTELY NO FRICTION**, as all the working parts are internal, and free from spindles, which are always liable to become fixed.

The apparatus is **EXTREMELY SENSITIVE AND RELIABLE**, and as it is in direct communication with the delivery port of the Feed Pump, automatically opening and closing as required, it is essential that such a Pump should be employed as would be **DEVOID OF A DEAD CENTRE**, for it is at times brought very nearly to a standstill, whilst at others it is required to start at half, and sometimes at full speed, **WITHOUT ATTENTION OR REGULATION BY AN ATTENDANT.**

A Pump answering to these requirements will be found in Mumford & Anthony's Patent Duplex type, which answers the severest tests most satisfactorily.

PARTICULARS OF THE SAME WILL BE FOUND ON PAGES 92 AND 93.

PRICES UPON APPLICATION.

CULVER STREET ENGINEERING WORKS, COLCHESTER.

